



BEST AVAILABLE COPY PATENT
131653

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: James Scott Vartuli et al.

: Art Unit: 1755

Serial No.: 10/690,794

: Examiner: Carol M. Koslow

Filed: October 22, 2003

For: TERBIUM OR LUTETIUM
CONTAINING SCINTILLATOR
COMPOSITIONS HAVING INCREASED
RESISTANCE TO RADIATION DAMAGE

DECLARATION OF CHARLES DAVID GRESKOVICH UNDER 37 CFR 1.132

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Charles David Greskovich declare and state as follows:

1. I have reviewed and understand the specification, drawings and claims of U.S. Patent No. 6,793,848 (hereinafter the "the '848 patent"), filed December 10, 2002 and issued September 21, 2004, and the specification, drawings and original claims of U.S. Application 10/690,794 (hereafter "the '794 application") filed October 22, 2003, which is a continuation-in-part of U.S. Patent No. 6,793,848.
2. I am an original, joint inventor of the invention(s) recited in the claims of the '848 patent.
3. To the extent that the '848 patent describes subject matter that relates to the Claimed Invention of the '794 application, I did not invent, nor did I provide any inventive contribution to, such subject matter.
4. My contribution of subject matter to the '848 patent relates to the reduction of radiation damage in materials by the adjustment of conditions during annealing. I did not invent, conceive, or select the scintillator compositions described in the '794 application. Rather, on information and belief, James Scott Vartuli and Robert Joseph Lyons conceived of and selected these compositions, and were the original, first, and joint inventors thereof.
5. I was employed by General Electric Company beginning in 1969 to my retirement in August 2002. From my conception of the subject matter of the '848 patent until my

retirement, I was obligated to, and did, assign my rights to the invention to General Electric Company.

6. I made no further contribution to the inventions claimed in the '848 patent after my retirement from General Electric Company, other than to review the patent application for technical accuracy and to execute formal papers in connection therewith.

7. As the person signing below:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application and any patent issued thereon.

SIGNATURE

Full Name: Charles David Gieskovich

Signature:

Charles David Gieskovich

Date:

April 25, 2005

Residence:

1229 Viewmont Dr, Schenectady, NY 12309

Citizenship: US

Post Office Address:

1229 Viewmont Dr, Schenectady, NY 12309



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: James Scott Vartuli et al. :
Serial No.: 10/690,794 : Art Unit: 1755
Filed: October 22, 2003 : Examiner: Carol M. Koslow
For: TERBIUM OR LUTETIUM :
CONTAINING SCINTILLATOR :
COMPOSITIONS HAVING INCREASED :
RESISTANCE TO RADIATION DAMAGE :

DECLARATION OF STEVEN JUDE DUCLOS UNDER 37 CFR 1.132

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Steven Jude Duclos, declare and state as follows:

1. I have reviewed and understand the specification, drawings and claims of U.S. Patent No. 6,793,848 (hereinafter the "the '848 patent"), filed December 10, 2002 and issued September 21, 2004, and the specification, drawings and original claims of U.S. Application 10/690,794 (hereafter "the '794 application") filed October 22, 2003, which is a continuation-in-part of U.S. Patent No. 6,793,848.
2. I am an original, joint inventor of the invention(s) recited in the claims of the '848 patent.
3. To the extent that the '848 patent describes subject matter that relates to the Claimed Invention of the '794 application, I did not invent, nor did I provide any inventive contribution to, such subject matter.
4. My contribution of subject matter to the '848 patent relates to the reduction of radiation damage in materials by the adjustment of conditions during annealing. I did not invent, conceive, or select the scintillator compositions described in the '794 application. I am and have been the immediate supervisor of James Scott Vartuli and Robert Joseph Lyons at General Electric Company, including during the period in which the project giving rise to the filings of the '848 patent and the '794 application were initiated. I was also the immediate supervisor of Charles David Greskovich during this period and continuing until his retirement in August 2002.

SD

1991

5. I have been employed by General Electric Company since ~~1986~~. From my conception of the subject matter of the '848 patent until the filing of the '848 patent, I was obligated to, and did, assign my rights to the invention to General Electric Company.

6. As the person signing below:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application and any patent issued thereon.

SIGNATURE

Full Name: Steven Jude Duclos

Signature: Steven Jude Duclos

Date: April 22, 2005

Residence: 61 Carriage Rd. Clifton Park NY 12065

Citizenship: US

Post Office Address: 61 Carriage Rd Clifton Park NY 12065



PATENT
131653

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: James Scott Vartuli et al.

Serial No.: 10/690,794

Filed: October 22, 2003

Art Unit: 1755

Examiner: Carol M. Koslow

For: TERBIUM OR LUTETIUM
CONTAINING SCINTILLATOR
COMPOSITIONS HAVING INCREASED
RESISTANCE TO RADIATION DAMAGE

DECLARATION OF JAMES SCOTT VARTULI UNDER 37 CFR 1.132

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, James Scott Vartuli, declare and state as follows:

1. I have reviewed and understand the specification, drawings and claims of U.S. Patent No. 6,793,848 (hereinafter the "the '848 patent'"), filed December 10, 2002 and issued September 21, 2004, and the specification, drawings and original claims of U.S. Application 10/690,794 (hereafter "the '794 application'") filed October 22, 2003, which is a continuation-in-part of U.S. Patent No. 6,793,848.
2. I am an original, joint inventor of the invention(s) recited in the claims of the '848 patent.
3. To the extent that the '848 patent describes subject matter that relates to the Claimed Invention of the '794 application, I am an original, joint inventor of such subject matter, along with Robert Joseph Lyons.
4. My contribution of subject matter to the '848 patent relates to the compositions of scintillator materials disclosed therein.
5. I am and have been employed by General Electric Company as a chemical engineer including the period from the initiation of the project that resulted in the '848 patent and the period from June 25, 2003 to August 22, 2003. From my conception of the subject matter of the '848 patent until the filing of the '794 application, I was obligated to, and did, assign my rights to the invention to General Electric Company.

6. I have reviewed the Declaration of Carl Vess under 37 CFR 1.132 and the notebook pages attached thereto, including (a) a list of barcoded sample identifications printed by computer and given to him to insert in my notebook for reference; (b) an page of the notebook on which he wrote his name and the project name (LuTAG project); (c) a page dated "8/3/03"; (d) a page dated "8/12/03"; (e) a page dated "8/14/03"; (f) a page dated "8/19/03"; and (g) a page dated "8/22/03". The Declaration of Carl Vess and the attachments are attached herewith as Exhibit A. All of the compositions listed therein were conceived by me jointly with Robert Joseph Lyon and only with Robert Joseph Lyon.

7. I have also reviewed the Declaration of Robert Joseph Lyon under 37 CFR 1.132 and the notebook pages attached thereto, including (a) a list of barcoded sample identifications printed by computer and inserted in my notebook for reference; (b) a page dated "6/25/03"; (c) a page dated "7/1/03"; (d) a page dated "7/16/03"; (e) a page dated "7/21/03"; (g) a page dated "7/28/03"; (h) a page dated "7/31/03"; and (i) a page dated "8/1/03". The Declaration of Robert Joseph Lyons and the attachments are attached herewith as Exhibit B. All of the compositions listed therein were conceived by me jointly with Robert Lyon and only with Robert Lyon.

8. I did not solicit, nor did I use any suggestions or direction regarding the sample compositions in the notebook pages from the Declarations of Carl Vess and Robert Joseph Lyon from any person other than Robert Joseph Lyon. I specifically did not solicit, nor did I use any suggestion or direction regarding the sample compositions from, Carl Vess, Charles David Greskovich, or Steven Jude Duclos.

9. As the person signing below:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application and any patent issued thereon.

SIGNATURE

Full Name: James Scott Vartuli

Signature: James Scott Vartuli Date: 4/15/05

Residence: 17 Partridge Glen, Rexford, NY 12148

Citizenship: US

Post Office Address: 17 Partridge Glen, Rexford, NY 12148

Exhibit A

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: James Scott Vartuli et al. :
: Art Unit: 1755
Serial No.: 10/690,794 :
: Examiner: Carol M. Koslow
Filed: October 22, 2003 :
:
For: TERBIUM OR LUTETIUM :
CONTAINING SCINTILLATOR :
COMPOSITIONS HAVING INCREASED :
RESISTANCE TO RADIATION DAMAGE :

DECLARATION OF CARL VESS UNDER 37 CFR 1.132

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Carl Vess, declare and state as follows:

1. I am and have been employed by General Electric Company as a chemical engineer, including during the period from August 8, 2003 to August 22, 2003.
2. During the period from August 8, 2003 to August 22, 2003, I processed samples of materials under the direction and supervision of Robert Joseph Lyons and James Scott Vartuli.
3. Attached and included herewith as Exhibit A are copies of pages from a laboratory notebook in which I kept notes of the processing of samples. The pages consist of (a) a list of barcoded sample identifications printed by computer and given to me to insert in my notebook for reference; (b) an page of the notebook on which I wrote my name and the project name (LuTAG project); (c) a page dated "8/3/03"; (d) a page dated "8/12/03"; (e) a page dated "8/14/03"; (f) a page dated "8/19/03"; and (g) a page dated "8/22/03".
4. I did not, myself, conceive of any of the compositions of the samples I processed and listed in the laboratory notebook pages listed above, nor do I have any reason to believe that any of the compositions were conceived by any person or persons other than Robert Joseph Lyons and James Scott Vartuli.
5. As the person signing below:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application and any patent issued thereon.

SIGNATURE

Full Name: Carl Vess

Signature: _____ Date: _____

Residence: _____

Citizenship: US

Post Office Address: _____

Exhibit A

Sample BarCode	Powder ID	Ce mole%	Lu mole%	Dopants	RE fraction
SC0090	RL070130	0.3	0		0.3755
SC0095	RL061003	.3	0	none	.3755
SC0110	RL070903	1.0	6.6	none	.3755
SC0111	RL072103	.2	6.6	none	.3755
SC0112	RL071603	1.2	6.6	none	.3755
SC0113	RL070903	.5	6.6	none	.3755
SC0114	RL070903	1.0	6.6	none	.3755
SC0115	RL071603	1.2	6.6	none	.3755
SC0116	RL070903	.5	6.6	none	.3755
SC0117	RL070130	0.3	0		0.3755
SC0122	RL072803	.8	6.5	none	.3755
SC0123	RL072803	.8	6.5	none	.3755
SC0126	RL073103	.65	6.6	none	.3755
SC0127	RL073103	.65	6.6	none	.3755
SC0128	RL080103	.3	6.6	none	.3755
SC0129	RL080103	.3	6.6	none	.3755
SC0130	RL073103	.65	6.6	none	.3755
SC0131	RL073103	.65	6.6	none	.3755
SC0133	RL072803	.8	6.6	none	.3755
SC0134	RL072803	.8	6.6	none	.3755
SC0145	CV0808903	.3	6.6	none	.3755
SC0146	CV0808903	.3	6.6	none	.3755
SC0151	CV081203	.3	12.7	none	.3755
SC0152	CV081203	.3	12.7	none	.3755
SC0153	CV081403	.3	26.7	none	.3755
SC0154	CV081403	.3	26.7	none	.3755
SC0160	CV082203	.3	6.6	none	.3755
SC0161	CV081903	.3	0	none	.3755
SC0162	CV081903	.3	0	none	.3755

Carl Vess
 LUTAG Project
 MB-181

National® Brand ACCOUNT BOOKS 10 1/2" x 8 1/2"

Black Textile with Maroon Corners and Spine.

Item No	Numbered Pages	Ruling
Item No. 56-211	150	Record
Item No. 56-212	"	Journal
Item No. 56-231	300	Record

Heavyweight Red Vinyl Covers

Item No. 57-211	150	Record
Item No. 57-231	300	Record

Olive Book Cloth with Maroon End Bands

Item No. 57-511	150	Record
Item No. 57-531	300	Record



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Brea, CA

Product Guarantee

Avery is committed to providing you with quality products, and will gladly replace any product which does not provide complete satisfaction. We also welcome your comments and suggestions. Please send your correspondence with product code to:

Avery Division, Consumer Service Center
 P.O. Box 129
 Brea, CA 92822-0129

8/8/03

2

Lo DOE

1/4 LoTAG .37% Ce .3755 RE Ratio 350g Batch

Th	227.8313g	H ₂ O	116.23L
Ce	1.3902g	H ₂ SO ₄	275.705 mL
Lo	17.321g	H ₂ O ₂	306.235 mL
Dawsonite	342.155g		
NH ₄ OH	862.235 mL	with 2L H ₂ O	

Dissolved completely. Difficulty in straining out particles from precipitation. Too much agglomeration. Did not strain thoroughly. Powder Sample after centrifuging looked smaller and more compact due to larger agglomerates

Problem w/ agglomeration due to pump speed more flow more particles. Slower speed leads to less agglomeration on sieve

L₀ DOE

8/12/03

3

$\frac{1}{2}$ L ₀ TAG	.370 Ce	.3755 RE Ratio	350g Batch
T _b 210.6910	H ₂ O	15.012 L	
Ce 1.3847	H ₂ SO ₄	374.22 mL	
L ₀ 34.504	H ₂ O ₂	283.196 mL	
Dawsonite 340.8003			

18

NH₄OH 862.234 mL with 2L H₂O

8/14/03

4

L6DO9

L6TAG 39% Ce 3755 Re Ratio 350g Batch

Tb 176.8143g

H₂O

12.6 mL

Ce ~~18.4~~ 1,513.8gH₂SO₄

371.3 mL

Lo 66.4462g

H₂O₂

237.7 mL

Dm 338.1260g

NH₄ 862.23 mL w/ 2L H₂O

problem with disphing. Cloudy solution.
 particles large due to not enough ammonium
 hydroxide in solution when precipitating

LUDOE

8/18/03

5

TAG 3% Ce .3755 RE Ratio 350g Batch

Tb 245.10g

H₂O 17.5L

Ce 1.396g

H₂SO₄ 377.2 mL

Lu 0g

H₂O₂ 329.9 mL

Carbonate 543.52g

CH₃OH 262.2 mL w/ 2L H₂O

6

LuDOE

8/12/03

 $\frac{1}{4}$ LOTAG .37.Ce .3755 RE Ratio 350g BatchTb 227.831g H_2O 16.23LCe 1.3902g H_2SO_4 375.7 mLLu 17.321g H_2O_2 306.23 mL

Dawsonite 342.1551g

 NH_4OH 862.235 mL w/ 2L H_2O

Exhibit B

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: James Scott Vartuli et.al. :
Serial No.: 10/690,794 : Art Unit: 1755
Filed: October 22, 2003 : Examiner: Carol M. Koslow
For: TERBIUM OR LUTETIUM :
CONTAINING SCINTILLATOR :
COMPOSITIONS HAVING INCREASED :
RESISTANCE TO RADIATION DAMAGE :

DECLARATION OF ROBERT JOSEPH LYONS UNDER 37 CFR 1.132

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Robert Joseph Lyons, declare and state as follows:

1. I have reviewed and understand the specification, drawings and claims of U.S. Patent No. 6,793,848 (hereinafter the "the '848 patent"), filed December 10, 2002 and issued September 21, 2004, and the specification, drawings and original claims of U.S. Application 10/690,794 (hereafter "the '794 application") filed October 22, 2003, which is a continuation-in-part of U.S. Patent No. 6,793,848.
2. I am an original, joint inventor of the invention(s) recited in the claims of the '848 patent.
3. To the extent that the '848 patent describes subject matter that relates to the Claimed Invention of the '794 application, I am an original, joint inventor of such subject matter, along with James Scott Vartuli.
4. My contribution of subject matter to the '848 patent relates to the compositions of scintillator materials disclosed therein.
5. I have been employed by General Electric Company as a material scientist since prior to the initiation of the project resulting in the '848 patent, and including the period from June 25, 2003 to August 1, 2003. From my conception of the subject matter of the '848 patent until the filing of the '794 application, I was obligated to, and did, assign my rights to the invention to General Electric Company.
6. Attached and included herewith as Exhibit A are copies of pages from a laboratory notebook in which I kept notes of the processing of samples. The pages consist of (a) a list of barcoded sample identifications printed by computer and inserted in

my notebook for reference; (b) a page dated "6/25/03"; (c) a page dated "7/1/03"; (d) a page dated "7/16/03"; (e) a page dated "7/21/03"; (f) a page dated "7/28/03"; (g) a page dated "7/31/03"; and (h) a page dated "8/1/03".

7. The sample compositions listed on each of the attached pages of my laboratory notebook were conceived by me jointly with James Scott Vartuli and only with James Scott Vartuli, and were, to the best of my knowledge, new at the time of conception. I did not solicit, nor did I use any suggestions or direction regarding these sample contributions from any person other than James Scott Vartuli. I specifically did not solicit, nor did I use any suggestion or direction regarding the sample compositions from Carl Vess, Charles David Greskovich, or Steven Jude Duclos.

8. I have reviewed the Declaration of Carl Vess under 37 CFR 1.132 and the notebook pages attached thereto, including (a) a list of barcoded sample identifications printed by computer and given to him to insert in my notebook for reference; (b) an page of the notebook on which he wrote his name and the project name (LuTAG project); (c) a page dated "8/3/03"; (d) a page dated "8/12/03"; (e) a page dated "8/14/03"; (f) a page dated "8/19/03"; and (g) a page dated "8/22/03". The Declaration of Carl Vess and the attachments thereto are attached and included herewith as Exhibit B. All of the compositions listed therein were conceived by me jointly with James Scott Vartuli and only with James Scott Vartuli. The work performed by Carl Vess that is detailed in his notebook pages was done under my direction and that of James Scott Vartuli so that the samples could be processed and measured more promptly.

9. As the person signing below:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application and any patent issued thereon.

SIGNATURE

Full Name: Robert Joseph Lyons

Signature: _____ Date: _____

Residence: _____

Citizenship: US

Post Office Address: _____

Exhibit A

Sample BarCode	Powder ID	Ce mole%	Lu mole%	Dopants	RE fraction
SC0090	RL070130	0.3	0		0.3755
SC0093	RL061003	.3	0	none	.3755
SC0110	RL070903	1.0	6.6	none	.3755
SC0111	RL072103	.2	6.6	none	.3755
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SC0115	RL071603	1.2	6.6	none	.3755
SC0116	RL070903	.5	6.6	none	.3755
SC0117	RL070130	0.3	0		0.3755
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SC0154	CV081403	.3	26.7	none	.3755
SC0160	CV082203	.3	6.6	none	.3755
SC0161	CV081903	.3	0	none	.3755
SC0162	CV081903	.3	0	none	.3755

-3% Ce TAG

6/10/03

.3755 Repeat of RL051603 batch

using LN_2 freeze & 1000°C calcine

42.02g $\text{Tb}_4\text{O}_7 \cdot 27$

.239g $\text{Ce}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$

49.49g lawsonite

in 3L H_2O

add 65mls H_2SO_4 &

56mls H_2O_2

stir warm until dissolved

148mls NH_4OH in 250mls H_2O

is precipitant

1000°C calcine

LN_2 freeze

7/1/03

• 3% Ce TAG at 3755

60 g batch

42.2186g Tb_4O_7

23.23g $Ce_2(SO_4)_3 \cdot 8H_2O$

49.49g Dawsonite

3l H_2O

65mls H_2SO_4

56mls H_2O_2

148mls NH_4OH

7/9/03

• 5% Ce + LuTAG • 3755
 250g batch size 162.410g Tb_4O_7 27
 12.374g Lu_2O_3
 1.655g $Ce(SO_4)_3 \cdot 8H_2O$
 205.428g Dawsonite

11.57 l H_2O

268 mls H_2SO_4

616 mls H_2O NH_4OH

218 mls H_2O_2

~~washed portion of batch with
 isopropanol - not as fine as
~~LuTAG~~ LuAG powder dried
 after 2 washes of isopropanol.~~

~~Screened some microwave dried
 material at -200 mesh.~~

	10.036g	4.081 x 2.042 x	.493
Sub batches	9.929g	4.091 x 2.044 x	.484

A = isopropanol dried

B = -60 mesh - reference

C = -60 - 200 mesh

D = -200 mesh

Options - Vertrel drying dry milling
 Vertrel milling
 air milling

7/16/03

1.2% Ce $\frac{1}{4}$ LuTAG batch

161.266 g Tb_4O_7

12.38 g Lu_2O_3

3.975 g $Ce_2(SO_4)_3 \cdot 8H_2O$

205.53 g dawsonite

270 mls H_2SO_4

12 l H_2O

216 mls H_2O_2

616 mls NH_4OH

Had to filter wash due to
centrifuge imbalance

9.399 g $4.316 \times 2.154 \times .428 \text{ cm } 2.49 \text{ g/cc}$

~~9.384~~ 9.384 g $4.333 \times 2.159 \times .417$ 2.534 g/cc $\frac{1}{2}$ of theoretical density

43.55% 2.665 g/cc

39.21% 2.400 g/cc

40.20% 2.46 g/cc

44.82% 2.743 g/cc

41.44% 2.536 g/cc

41.27% 2.526 g/cc

7/21/03

2% Ce $\frac{1}{4}$ LuTAG 3735
162.90g $Tb_4O_7 \cdot 27$
12.371g Lu_2O_3
6620g $Ce_2(SO_4)_3 \cdot 8H_2O$
205.385g unfiltered dawsonite

268.5 mls H_2SO_4
219 mls H_2O_2 30%
616 mls NH_4OH
12L H_2O

need to add 30 mls extra
 NH_4OH to compensate
for losses from adding
the sulfate warm
This is a 5% increase
lower temp drying

9.385g $4.158 \times 2.076 \times .454$ cm 2.529g
significantly smaller diameter
for isopressed pellet than
for other batches. This
indicates that 70C drying
resulted in smaller or ~~less~~
weaker agglomerates.

7/28/03

.3755 Repeat .8% Ce $\frac{1}{4}$ LuTAG batch

161.92g Tb_4O_7

12.376g Lu_2O_3

2.649g $Ce_2(SO_4)_3 \cdot 8H_2O$

205.471g dawsonite

268mls H_2SO_4

11.5L H_2O

218 mls H_2O_2

616 mls NH_4OH

2 small wafers made from powder
fast frozen in $\frac{1}{4}$ " thick layer,
marked 8 TL for thin layer.

Green density is not different
than the rest of the batch

$\sim 2.37/c$

7/31/03

.65 Ce $\frac{1}{4}$ Lu TAG .3755

162.165g Tb₄O₇

12.375g Lu₂O₃

2.152g Ce₂(SO₄)₃ · 8H₂O
in 12 L H₂O

270 mls H₂SO₄

220 mls H₂O₂

244.46g dawsonite from
new lot

616 mls NH₄OH

New dawsonite batch has
more insoluble alumina
and larger weight loss than
earlier lot. but added to
cold sulfate after Rare earths
were dissolved - based on
next batch, it wasn't completely
dissolved

8/1/03

0.3% Ce $\frac{1}{4}$ LuTAG .3755

350g batch

227.83g Tb₄O_{7,27}

17.32g Lu₂O₃

1.398g Ce₂(SO₄)₃ · 8H₂O

342.15g lawsonite

16.2L H₂O

375 mls H₂SO₄

306 mls H₂O₂

862 mls NH₄OH in 2L H₂O

Exhibit B

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: James Scott Vartuli et al. :
Serial No.: 10/690,794 : Art Unit: 1755
Filed: October 22, 2003 : Examiner: Carol M. Koslow
For: TERBIUM OR LUTETIUM :
CONTAINING SCINTILLATOR :
COMPOSITIONS HAVING INCREASED :
RESISTANCE TO RADIATION DAMAGE :

DECLARATION OF CARL VESS UNDER 37 CFR 1.132

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Carl Vess, declare and state as follows:

1. I am and have been employed by General Electric Company as a chemical engineer, including during the period from August 8, 2003 to August 22, 2003.
2. During the period from August 8, 2003 to August 22, 2003, I processed samples of materials under the direction and supervision of Robert Joseph Lyons and James Scott Vartuli.
3. Attached and included herewith as Exhibit A are copies of pages from a laboratory notebook in which I kept notes of the processing of samples. The pages consist of (a) a list of barcoded sample identifications printed by computer and given to me to insert in my notebook for reference; (b) an page of the notebook on which I wrote my name and the project name (LuTAG project); (c) a page dated "8/3/03"; (d) a page dated "8/12/03"; (e) a page dated "8/14/03"; (f) a page dated "8/19/03"; and (g) a page dated "8/22/03".
4. I did not, myself, conceive of any of the compositions of the samples I processed and listed in the laboratory notebook pages listed above, nor do I have any reason to believe that any of the compositions were conceived by any person or persons other than Robert Joseph Lyons and James Scott Vartuli.
5. As the person signing below:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application and any patent issued thereon.

SIGNATURE

Full Name: Carl Vess

Signature: _____ Date: _____

Residence: _____

Citizenship: US

Post Office Address: _____

Exhibit A

Sample BarCode	Powder ID	Ce mole%	Lu mole%	Dopants	RE fraction
SC0090	RL070130	0.3	0		0.3755
SC0093	RL061003	.3	0	none	.3755
SC0110	RL070903	1.0	6.6	none	.3755
SC0111	RL072103	.2	6.6	none	.3755
SC0112	RL071603	1.2	6.6	none	.3755
SC0113	RL070903	.5	6.6	none	.3755
SC0114	RL070903	1.0	6.6	none	.3755
SC0115	RL071603	1.2	6.6	none	.3755
SC0116	RL070903	.5	6.6	none	.3755
SC0117	RL070130	0.3	0		0.3755
SC0122	RL072803	.8	6.5	none	.3755
SC0123	RL072803	.8	6.5	none	.3755
SC0126	RL073103	.65	6.6	none	.3755
SC0127	RL073103	.65	6.6	none	.3755
SC0128	RL080103	.3	6.6	none	.3755
SC0129	RL080103	.3	6.6	none	.3755
SC0130	RL073103	.65	6.6	none	.3755
SC0131	RL073103	.65	6.6	none	.3755
SC0133	RL072803	.8	6.6	none	.3755
SC0134	RL072803	.8	6.6	none	.3755
SC0145	CV0808903	.3	6.6	none	.3755
SC0146	CV0808903	.3	6.6	none	.3755
SC0151	CV081203	.3	12.7	none	.3755
SC0152	CV081203	.3	12.7	none	.3755
SC0153	CV081408	.3	26.7	none	.3755
SC0154	CV081403	.3	26.7	none	.3755
SC0160	CV082203	.3	6.6	none	.3755
SC0161	CV081903	.3	0	none	.3755
SC0162	CV081903	.3	0	none	.3755

Carl Vess
 LuTAG Project
 MB-181

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Black Taxhide with Maroon Corners and Spine

Item No	Numbered Pages	Ruling
Item No. 56-211	150	Record
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Heavyweight Red Vinyl Covers

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8/8/03

2

LO DOE

1/4 Lb TAG .37% Ce .3755 RE Ratio 350g Batch

Tb	227.8313g	H ₂ O	16.23L
Ce	1.3902g	H ₂ SO ₄	275.705 mL
Lu	17.321g	H ₂ O ₂	306.235 mL
Dimerside	342.155g		
NH ₄ OH	862.235 mL	with 2L H ₂ O	

Dissolved completely. Difficulty in straining out particles from precipitation. Too much agglomeration. Did not strain thoroughly. Powder Sample after centrifuging looked smaller and more compact due to larger agglomerates.

Problem w/ agglomeration due to pump speed more flow more particles. Slower speed leads to less agglomeration on sieve.

L₀ DOE

8/12/03

3

1/2 L₀ TAG .370 Ce .3755 RE Ratio 350g Batch

Tb 210.6910

H₂O

15.012 L

Ce 1.3847

H₂SO₄

374.22 mL

L₀ 34.504

H₂O₂

283.196 mL

Dawsonite 340.8003

18

NH₄OH

862.234 mL

with 2L H₂O

8/11/03

L6DO9

4

LUTAG 39.0 Ce 3755 Re Ratio 350g Batch

Tb 1740.8143g

 H_2O

12.6 mL

Ce 18.41.5136g

 H_2SO_4

371.3 mL

Lo 66.4142g

 H_2O_2

237.7 mL

Damon 339.1266g

Wt 862.23 mL w/ 2L H_2O

problem with dispersing. Cloudy solution.
 particles large due to not enough ammonium
 hydroxide in solution when precipitating

LU DOE

8/19/03

5

TRG .37% Ce .3755 RE Ratio 350g Batch

Tb 245.108g

H₂O 17.5L

Ce 1.396g

H₂SO₄ 377.2 mL

Lu O₂

H₂O₂ 329.9 mL

Downsize 943.52g

OH₂ 862.2 mL w/ 2L H₂O

6

LuDOE

8/12/03

 $\frac{1}{4}$ LOTAG .37.Ce .3755 RE Ratio 350g Batch

Th 227.851g

H₂O 16.23 L

Ce 1.3902g

H₂SO₄ 375.7 mL

Lu 17.321g

H₂O₂ 306.25 mL

Dawsonite 342.1551g

NH₄OH 862.235 mL w/ 2L H₂O

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: James Scott Vartuli et al.

: Art Unit: 1755

Serial No.: 10/690,794

: Examiner: Carol M. Koslow

Filed: October 22, 2003

For: TERBIUM OR LUTETIUM
CONTAINING SCINTILLATOR
COMPOSITIONS HAVING INCREASED
RESISTANCE TO RADIATION DAMAGE

DECLARATION OF ROBERT JOSEPH LYONS UNDER 37 CFR 1.132

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Robert Joseph Lyons, declare and state as follows:

1. I have reviewed and understand the specification, drawings and claims of U.S. Patent No. 6,793,848 (hereinafter the "the '848 patent"), filed December 10, 2002 and issued September 21, 2004, and the specification, drawings and original claims of U.S. Application 10/690,794 (hereafter "the '794 application") filed October 22, 2003, which is a continuation-in-part of U.S. Patent No. 6,793,848.
2. I am an original, joint inventor of the invention(s) recited in the claims of the '848 patent.
3. To the extent that the '848 patent describes subject matter that relates to the Claimed Invention of the '794 application, I am an original, joint inventor of such subject matter, along with James Scott Vartuli.
4. My contribution of subject matter to the '848 patent relates to the compositions of scintillator materials disclosed therein.
5. I have been employed by General Electric Company as a material scientist since prior to the initiation of the project resulting in the '848 patent, and including the period from June 25, 2003 to August 1, 2003. From my conception of the subject matter of the '848 patent until the filing of the '794 application, I was obligated to, and did, assign my rights to the invention to General Electric Company.
6. Attached and included herewith as Exhibit A are copies of pages from a laboratory notebook in which I kept notes of the processing of samples. The pages consist of (a) a list of barcoded sample identifications printed by computer and inserted in

my notebook for reference; (b) a page dated "6/25/03"; (c) a page dated "7/1/03"; (d) a page dated "7/16/03"; (e) a page dated "7/21/03"; (g) a page dated "7/28/03"; (h) a page dated "7/31/03"; and (i) a page dated "8/1/03".

7. The sample compositions listed on each of the attached pages of my laboratory notebook were conceived by me jointly with James Scott Vartuli and only with James Scott Vartuli, and were, to the best of my knowledge, new at the time of conception. I did not solicit, nor did I use any suggestions or direction regarding these sample contributions from any person other than James Scott Vartuli. I specifically did not solicit, nor did I use any suggestion or direction regarding the sample compositions from Carl Vess, Charles David Greskovich, or Steven Jude Duclos.

8. I have reviewed the Declaration of Carl Vess under 37 CFR 1.132 and the notebook pages attached thereto, including (a) a list of barcoded sample identifications printed by computer and given to him to insert in my notebook for reference; (b) an page of the notebook on which he wrote his name and the project name (LuTAG project); (c) a page dated "8/3/03"; (d) a page dated "8/12/03"; (e) a page dated "8/14/03"; (f) a page dated "8/19/03"; and (g) a page dated "8/22/03". The Declaration of Carl Vess and the attachments thereto are attached and included herewith as Exhibit B. All of the compositions listed therein were conceived by me jointly with James Scott Vartuli and only with James Scott Vartuli. The work performed by Carl Vess that is detailed in his notebook pages was done under my direction and that of James Scott Vartuli so that the samples could be processed and measured more promptly.

9. As the person signing below:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application and any patent issued thereon.

SIGNATURE

Full Name: Robert Joseph Lyons

Signature: Robert Joseph Lyons Date: April 20, 2005

Residence: 10 Yolanda drive Burnt Hills NY 12027

Citizenship: US

Post Office Address: 10 Yolanda drive Burnt Hills NY 12027

Exhibit A

Sample BarCode	Powder ID	Ce mole%	Lu mole%	Dopants	RE fraction
SC0090	RL070130	0.3	0		0.3755
SC0093	RL061003	.3	0	none	.3755
SC0110	RL070903	1.0	6.6	none	.3755
SC0111	RL072103	.2	6.6	none	.3755
SC0112	RL071603	1.2	6.6	none	.3755
SC0113	RL070903	.5	6.6	none	.3755
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SC0154	CV081403	.3	26.7	none	.3755
SC0160	CV082203	.3	6.6	none	.3755
SC0161	CV081903	.3	0	none	.3755
SC0162	CV081903	.3	0	none	.3755

3% Ce TAG

6/10/03

3755 Repeat of RLO51603 batch
using LN₂ freeze & 100°C calcine
42.02g Tb₄O_{7.27}
.239g Ce₂(SO₄)₃ · 8H₂O
49.49g lawsonite
in 3L H₂O
add 65mls H₂SO₄ &
56mls H₂O₂
stir warm until dissolved
148mls NH₄OH in 250mls H₂O
is precipitant
100°C calcine
LN₂ freeze.

7/1/03

.3% Ce TAG at .3755

60 g batch

42.0186g Tb_4O_7

23.23g $Ce_2(SO_4)_3 \cdot 8H_2O$

49.49g dawsonite

3l H_2O

65 mls H_2SO_4

50 mls H_2O_2

148 mls NH_4OH

7/9/03

• 5% Ce of LuTAG • 3755
 250g batch size 162.410g $Tb_4O_7 \cdot 27$
 12.374g Lu_2O_3
 1.655g $Ce(SO_4)_3 \cdot 8H_2O$
 205.428g Dawsonite

11.57 l H_2O

268 mls H_2SO_4

616 mls ~~H_2O_2~~ NH_4OH

218 mls H_2O_2

~~washed portion of batch with
 isopropanol - not as fine as
~~LuTAG~~ LuAG powder dried
 after 2 washes of isopropanol.~~

~~Screened some microwave dried
 material at -200 mesh.~~

	10.036g	4.081 x 2.040 x	.493
Sub batches	9.929g	4.091 x 2.044 x	.484
A =	isopropanol dried		
B =	-60 mesh	-	reference
C =	-60 - 200 mesh		
D =	-200 mesh		

Options - Vertrel drying dry milling
 Vertrel milling
 air milling

7/10/03

1.2% Ce $\frac{1}{4}$ LuTAG batch

161.266 g $Tb_4O_{7,27}$

12.38 g Lu_2O_3

3.975 g $Ce_2(SO_4)_3 \cdot 8H_2O$

205.53 g dawsomite

270 mls H_2SO_4

12 l H_2O

216 mls H_2O_2

616 mls NH_4OH

Had to filter wash due to
centrifuge imbalance

9.299 g $4.3116 \times 2.154 \times .428 \text{ cm}$ 2.498/cc

9.284 g $4.333 \times 2.159 \times .417$ 2.534% of then. density

43.55% 2.6659/cc

39.21% 2.4009/cc

40.20% 2.468/cc

44.82% 2.7439/cc

41.44% 2.5369/cc

41.27% 2.5269/cc

7/21/03

2% Ce $\frac{1}{4}$ LuTAG 0.3755
162.90g $\text{Th}_4\text{O}_7 \cdot 27$
12.371g Lu_2O_3
0.6620g $\text{Ce}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$
205.385g unfiltered dawsonite

268.5 mls H_2SO_4
219 mls H_2O_2 35%
616 mls NH_4OH
12L H_2O

need to add 30 mls extra
 NH_4OH to compensate
for losses from adding
the sulfate warm

This is a 5% increase
lower temp drying

9.885g $4.158 \times 2.076 \times .454 \text{ cm}$ 2.529/w
significantly smaller diameter
for isopressed pellet than
for other batches. This
indicates that 70°C drying
resulted in smaller or ~~less~~
weaker agglomerates.

7/28/03

.3755 Repeat .8% Ce $\frac{1}{4}$ LuTAG batch

161.92g Tb_4O_7

12.376g Lu_2O_3

2.649g $Ce_2(SO_4)_3 \cdot 8H_2O$

205.471g dowsomite

268 mls H_2SO_4

11.5 l H_2O

218 mls H_2O_2

616 mls NH_4OH

2 small wafers made from powder
fast frozen in $\frac{1}{4}$ " thick layer,
marked 8 TL for thin layer.

Green density is not different
than the rest of the batch

$\sim 2.39/g$

7/31/03

65 Ce $\frac{1}{4}$ Lu TAG .3755
162.165g Tb₄O₇
12.375g Lu₂O₃
2.152g Ce₂(SO₄)₃ · 8H₂O
in 12 l H₂O
270 mls H₂SO₄
220 mls H₂O₂
244.46g dawsonite from
new lot
616 mls NaOH

New dawsonite batch has
more insoluble alumina
and larger weight loss than
earlier lot. but added to
cold sulfate after Rare earths
were dissolved - based on
next batch, it wasn't completely
dissolved

2/11/03

0.3% Ce $\frac{1}{4}$ LuTAG .3755
350g batch

227.83g $Tb_4O_{7,27}$

17.32g Lu_2O_3

1.398g $Ce_2(SO_4)_3 \cdot 8H_2O$

342.15g lawsonite

16.2 l H_2O

375 mls H_2SO_4

306 mls H_2O_2

862 mls NH_4OH in 2l H_2O

Exhibit B

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: James Scott Vartuli et al. :
Serial No.: 10/690,794 : Art Unit: 1755
Filed: October 22, 2003 : Examiner: Carol M. Koslow
For: TERBIUM OR LUTETIUM :
CONTAINING SCINTILLATOR :
COMPOSITIONS HAVING INCREASED :
RESISTANCE TO RADIATION DAMAGE :

DECLARATION OF CARL VESS UNDER 37 CFR 1.132

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Carl Vess, declare and state as follows:

1. I am and have been employed by General Electric Company as a chemical engineer, including during the period from August 8, 2003 to August 22, 2003.
2. During the period from August 8, 2003 to August 22, 2003, I processed samples of materials under the direction and supervision of Robert Joseph Lyons and James Scott Vartuli.
3. Attached and included herewith as Exhibit A are copies of pages from a laboratory notebook in which I kept notes of the processing of samples. The pages consist of (a) a list of barcoded sample identifications printed by computer and given to me to insert in my notebook for reference; (b) an page of the notebook on which I wrote my name and the project name (LuTAG project); (c) a page dated "8/3/03"; (d) a page dated "8/12/03"; (e) a page dated "8/14/03"; (f) a page dated "8/19/03"; and (g) a page dated "8/22/03".
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5. As the person signing below:

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SIGNATURE

Full Name: Carl Vess

Signature: _____ Date: _____

Residence: _____

Citizenship: US

Post Office Address: _____

Exhibit A

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SC0093	RL061003	.3	0	none	.3755
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SC0111	RL072103	.2	6.6	none	.3755
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SC0117	RL070130	0.3	0		0.3755
SC0122	RL072803	.8	6.5	none	.3755
SC0123	RL072803	.8	6.5	none	.3755
SC0126	RL073103	.65	6.6	none	.3755
SC0127	RL073103	.65	6.6	none	.3755
SC0128	RL080103	.3	6.6	none	.3755
SC0129	RL080103	.3	6.6	none	.3755
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SC0146	CV0808903	.3	6.6	none	.3755
SC0151	CV081203	.3	12.7	none	.3755
SC0152	CV081203	.3	12.7	none	.3755
SC0153	CV081403	.3	26.7	none	.3755
SC0154	CV081403	.3	26.7	none	.3755
SC0180	CV082203	.3	6.6	none	.3755
SC0161	CV081903	.3	0	none	.3755
SC0162	CV081903	.3	0	none	.3755

Carl Vess
 LOTAG Project
 MB-181

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 Brea, CA 92822-0129

8/8/03

2

Lo DOE

1/4 Lo TAG .37% Ce .3755 RE Ratio 350g Batch

Tb 227.8313g

H₂O

16.23L

Ce 1.3982g

H₂SO₄

75.705 mL

Lo 17.321g

H₂O₂

306.235 mL

Dissolve

342.551g

NH₄OH

862.235 mL

with 2L H₂O

Dissolved completely. Difficulty in straining out particles from precipitation. Too much agglomeration. Did not strain thoroughly. Powder sample after centrifuging looked smaller and more compact due to larger agglomerates.

Problem w/ agglomeration due to pump speed more flow / more particles. Slower speed leads to less agglomeration on sieve.

LO DOE

8/12/03

3

1/2 LOTAG .370 Ce .3755 RE Ratio 350g Batch

Tb 210.6910

H₂O

15.012 L

Ce 1.3847

H₂SO₄

374.22 mL

LO 34.504

H₂O₂

283.196 mL

Densitate 340.8003

16

NH₄OH 862.234 mL with 2L H₂O

8/14/03

4

L0DO9

L0TAG 37% Ce 3755 Re Ratio 350g Batch

Tb 176.513g H₂O 12.6 mLCe 1.3755g H₂SO₄ 371.3 mLLo 66.410g H₂O₂ 237.7 mL

Dunk 338.126g

NH₄OH 862.23 mL w/ 2L H₂O

problem with dispersing. Cloudy solution.
 particles large due to not enough ammonium
 hydroxide in solution when precipitating

Lu DOE

8/18/03

5

TAG 3% Ce .3755 RE Ratio 350_g Batch

Ta 245.10 g

H₂O 17.5 L

Ce 1.396 g

H₂SO₄ 377.2 ml

Lu O₂

H₂O₂ 329.9 ml

Balance 343.52 g

Wt 262.2 ml w/ 2L H₂O

LuDOE

8/22/03

6

1/4 LOTAG .37.Ce .375502 Ratio 350g Batch

Tb 227.831g

H₂O 16.25 L

Ce 1.3902g

H₂SO₄ 375.7 mL

Lu 17.321g

H₂O₂ 306.25 mL

Dawsonite 342.1551g

NH₄OH 862.235 mL w/ 2L H₂O

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: James Scott Vartuli et al.

: Art Unit: 1755

Serial No.: 10/690,794

: Examiner: Carol M. Koslow

Filed: October 22, 2003

For: TERBIUM OR LUTETIUM
CONTAINING SCINTILLATOR
COMPOSITIONS HAVING INCREASED
RESISTANCE TO RADIATION DAMAGE

DECLARATION OF CARL VESS UNDER 37 CFR 1.132

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Carl Vess, declare and state as follows:

1. I am and have been employed by General Electric Company as a chemical engineer, including during the period from August 8, 2003 to August 22, 2003.
2. During the period from August 8, 2003 to August 22, 2003, I processed samples of materials under the direction and supervision of Robert Joseph Lyons and James Scott Vartuli.
3. Attached and included herewith as Exhibit A are copies of pages from a laboratory notebook in which I kept notes of the processing of samples. The pages consist of (a) a list of barcoded sample identifications printed by computer and given to me to insert in my notebook for reference; (b) an page of the notebook on which I wrote my name and the project name (LuTAG project); (c) a page dated "8/3/03"; (d) a page dated "8/12/03"; (e) a page dated "8/14/03"; (f) a page dated "8/19/03"; and (g) a page dated "8/22/03".
4. I did not, myself, conceive of any of the compositions of the samples I processed and listed in the laboratory notebook pages listed above, nor do I have any reason to believe that any of the compositions were conceived by any person or persons other than Robert Joseph Lyons and James Scott Vartuli.
5. As the person signing below:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application and any patent issued thereon.

SIGNATURE

Full Name: Carl Vess

Signature: Carl J. Vess Date: 4/15/2005

Residence: 1905 Riverview Dr. Green Island, NY 12183

Citizenship: US

Post Office Address: 1905 Riverview Dr. Green Island, NY 12183

Exhibit A

Sample BarCode	Powder ID	Ce mole%	Lu mole%	Dopants	RE fraction
SC0090	RL070130	0.3	0		0.3755
SC0093	RL061003	.3	0	none	.3755
SC0110	RL070903	1.0	6.6	none	.3755
SC0111	RL072103	.2	6.6	none	.3755
SC0112	RL071603	1.2	6.6	none	.3755
SC0113	RL070903	.5	6.6	none	.3755
SC0114	RL070903	1.0	6.6	none	.3755
SC0115	RL071603	1.2	6.6	none	.3755
SC0116	RL070903	.5	6.6	none	.3755
SC0117	RL070130	0.3	0		0.3755
SC0122	RL072803	.8	6.5	none	.3755
SC0123	RL072803	.8	6.5	none	.3755
SC0126	RL073103	.65	6.6	none	.3755
SC0127	RL073103	.65	6.6	none	.3755
SC0128	RL080103	.3	6.6	none	.3755
SC0129	RL080103	.3	6.6	none	.3755
SC0130	RL073103	.65	6.6	none	.3755
SC0131	RL073103	.65	6.6	none	.3755
SC0133	RL072803	.8	6.6	none	.3755
SC0134	RL072803	.8	6.6	none	.3755
SC0145	CV0808903	.3	6.6	none	.3755
SC0146	CV0808903	.3	6.6	none	.3755
SC0151	CV081203	.3	12.7	none	.3755
SC0152	CV081203	.3	12.7	none	.3755
SC0153	CV081403	.3	26.7	none	.3755
SC0154	CV081403	.3	26.7	none	.3755
SC0160	CV082203	.3	6.6	none	.3755
SC0161	CV081903	.3	0	none	.3755
SC0162	CV081903	.3	0	none	.3755

Carl Vess
 LUTAG Project
 MB-181

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8/8/03

2

L10 DOE

1/4 Lb TAG .3% Ce .3755 RE Ratio 350g Batch

Tb	227.8313g	H ₂ O	116.23L
Ce	1.3982g	H ₂ SO ₄	275.705 mL
Lo	17.321g	H ₂ O ₂	306.235 mL
Dawsonite	342.551g		
NH ₄ OH	862.235 mL	with 2L H ₂ O	

Disolved completely. Difficulty in straining out particles from precipitation. Too much agglomeration. Did not strain throughly. Powder Sample after centrifuging looked smaller and more compact due to larger agglomerates

Problem w/ agglomeration due to pump speed more flow / more particles. Slower speed leads to less agglomeration on sieve

L6 DOE

8/12/03

3

1/2 LDTAG .370 Ce .3755 RE Ratio 350g Batch

Tb 210.6910

H₂O

15.012 L

Ce 1.3847

H₂SO₄

374.22 mL

LD 34.504

H₂O₂

283.196 mL

Dawsonite 340.8003

#

NH₄OH

862.234 mL

with 2L H₂O

8/11/03

4

L0D09

L0TAG 39.6 Ce 3755 Re Ratio 350g Batch

Tb 1716.8143g

H₂O 12.6 mL

Ce 1841.3158g

H₂SO₄ 371.3 mL

Lo 166.4142g

H₂O₂ 237.7 mL

Dens 338.1228g

NH₄OH 862.23 mL w/ 2L H₂O

problem with dissolving. Cloudy solution.
 particles large due to not enough ammonium
 hydroxide in solution when precipitating

LU DOE

8/19/03

5

TAG 37% Ce .3755 RE Ratio 350g Batch

Tb 245.108g

H₂O 17.5L

Ce 1.386g

H₂SO₄ 377.2 mL

Lu 0g

H₂O₂ 329.9 mL

Residue 943.52g

NH₄OH 262.2 mL w/ 2L H₂O

8/22/03

LuDOE

6

1/4 LOTAG .37.Ce .3755 RE Ratio 350g Batch

Tb	227.831g	H ₂ O	16.235 L
Ce	1.3902g	H ₂ SO ₄	375.7 mL
Lu	17.321g	H ₂ O ₂	306.75 mL
Dawsonite	342.1551g		
NH ₄ OH	862.235 mL	w/	2L H ₂ O

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